

Saturday



Magazine.

No. 415.

DECEMBER

22ND, 1838.{ PRICE
ONE PENNY

THE NAVAL AND MILITARY ESTABLISHMENTS AT WOOLWICH.



THE ROTUNDA, OR REPOSITORY, AT WOOLWICH.

THE town of Woolwich, at present so well known on account of its naval arsenal, was originally a small fishing village of little note. Its advantageous situation on the banks of the Thames, being only eight miles from London, and more particularly the great depth of the river at this spot, capable at all times of the tide of floating the largest vessels, have been the cause of its gradual increase in importance. These favourable circumstances were noticed as far back as the reign of Henry the Seventh, who had a large vessel built here, of a thousand tons burden. It was not, however, until the time of Henry the Eighth that any regular dock-yard was established at Woolwich. After his death the establishment was greatly increased by Queen Elizabeth, and since then it has been progressively improved and enlarged. In the reign of Charles the First, a large vessel was built, of 1637 tons burden, which was formidably armed, and superbly gilded: from its destructive powers, it was called by the Dutch, with whom we were then at war, the "Golden Devil."

Woolwich, up to the time of George the First, continued simply noted for its dock-yard; but in the reign of that monarch, the foundry for cannon was removed from Moorfields, where it had previously been carried on, to the Warren that adjoins the town. The cause of its removal was a dreadful accident, which occurred by the explosion of the moulds, which were in a damp

state, at the time of filling them with the melted metal. From this time Woolwich gradually assumed the character of a naval arsenal.

The appearance of the town itself, at least of the older buildings, is far from prepossessing; that part, however, which adjoins Charlton and the common, must be excluded from this censure.

It is to the public buildings that Woolwich owes its importance. The dock-yard extends along the bank of the river, for a mile in length: it contains, besides the dwellings for the officers, a smithery, in which there are two steam-engines, one of twenty and the other of fourteen horse power, the largest being employed in working two large lift-hammers, weighing nearly four tons each; these are raised by machinery, nine inches at each stroke, from thirty to fifty times in a minute: these hammers are employed in forging large anchors, and other iron work connected with ship building; the smaller engine is attached to the blowing apparatus, by which the fires of the forges are excited.

There are two dry docks, one double, and several slips, in which vessels of the largest size are built. A large basin, 400 feet long, and 290 feet in breadth, is also within the enclosure of the dock-yard, together with a mast-pond, a boat-pond, and numerous store-houses, and other buildings necessary for the workmen.

To the east of the dock-yard is the royal arsenal. It contains within its boundaries 100 acres of ground, together with a canal which occupies the extent of forty-two acres. Nearly opposite the entrance is a handsome row of houses, for the accommodation of the officers connected with the establishment. The enclosure includes immense ranges of store-houses, containing warlike stores of every description, in such quantities as to astonish even those accustomed to sights of this description. Beyond the guard-house, which is a handsome building, is the royal brass-foundry, where brass guns only are cast; to the east of the foundry are workshops for engraving and boring the cannon. All the ordnance used by the East India Company, and in the merchant service, is sent here to be proved before it is taken into use. Adjoining these buildings are the workshops for the manufacturing of gun-carriages and military wagons of every description, with machinery, worked by steam-engines, employed in planing, sawing, and turning wood or metal. Rather to the north of the foundry is the laboratory, in which blank and ball cartridges, of every description, are manufactured; and grape, canister, and other destructive ammunition, of various kinds, are prepared: here, also, are to be seen, machines for proving the strength of gunpowder, and samples of the varieties used by different nations, with models of fire-ships, fireworks, muskets, and many other objects of the same description. In the open air, or under sheds, surrounded by the immense storehouses we have described, are iron ordnance of various calibres, arranged in double rows, extending for several hundreds of yards in length, together with gun-carriages, piles of shot, iron water-tanks, &c., in great profusion.

The canal, which is thirty-five feet in breadth, has along its banks ranges of wooden buildings, in which Congreve-rockets are manufactured. Near this spot is a saw-mill, in which large timber is sawn, by means of perpendicular saws, worked by steam. The same engine also gives motion to circular saws of various sizes, lathes for turning, &c.

The barracks for the sappers and miners is a short distance from the arsenal, and nearer to Woolwich Common; near to this is a grand dépôt of field train artillery, ready to be embarked at a minute's notice, and furnished with ammunition and material of every kind.

The barracks of the artillery form a splendid range of buildings, facing Woolwich Common; on the parade, in front of this building are several large and curious pieces of brass ordnance.

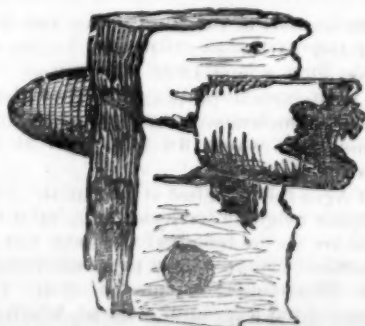
On the other side of the common, that is, opposite the barracks, is the Royal Military Academy, which was formerly established for instruction in the ordnance department, but is now used for the preparation of cadets for the East India service.

Looking westward from the parade in front of the barracks, the eye of the spectator is attracted by a curiously shaped building, in the form of a huge tent; this is the Rotunda or Repository, and contains numerous objects of curiosity and interest relating to the defence of the kingdom. The space surrounding this building is tastefully laid out in gravel walks and parterres, and contains within its enclosure, all the requisites for the instruction of the artillery in the practice of their formidable mode of warfare. There are model rooms containing drawings and models of implements of war, workshops in which experiments are made and new models constructed, and in the open air different kinds of fortifications are erected by the students, and all the details of the management of artillery are put in practice for the purpose of instruc-

tion, near an artificial fortification constructed of earth. On the left hand as you enter the grounds, the method of loading and firing the larger kind of ordnance, used in fortified places, is taught with all the attention to minutiae which would be practised in the case of a siege.

The ground near this spot is beautifully diversified and irregular in its surface, and interspersed with several pieces of water; this condition of the ground affords excellent practice to the men, in dragging the guns up steep acclivities, or lowering them down rapid descents, forming pontoon bridges to transport them over water, and imitating all the operations of actual war. Round the entrance to the building many curious specimens of brass ordnance are seen; among them, two with three barrels each captured at the battle of Malplaquet, a village in the north of France.

The Rotunda was originally erected in the gardens of Carlton House, by order of the Prince Regent, for the entertainment of the allied sovereigns during their visit to England, in 1814; it is a circular apartment, one hundred and fifteen feet in diameter, with low walls, in which the windows that admit the light are placed. The roof, which is like the awning of a tent, is supported in the centre by a stately Doric column of freestone, the pedestal of which is decorated with various pieces of armour, and half way up the shaft, a complete suit of inlaid steel armour is placed. From the summit of the pillars strong gilded cords proceed to the circumference, and support the canvas roof, to the painting and repair of which, the most scrupulous attention is paid to preserve it against the effects of the weather. The stone column we have described was not in the original construction at Carlton House. Round the base are four collections of fire-arms, in the form of trophies, showing the gradual improvement of small arms during the last hundred years or more; among them is a carbine with seven barrels, and a French musket furnished with a percussion and a flint lock, either of which can be used at pleasure. The models of different fortifications which are placed in the area of the room, are exceedingly beautiful, consisting of the principal British dockyards, and their means of defence. The town of Quebec, in America, the rock and batteries of Gibraltar, and other celebrated places. Round these larger models, others of a smaller size are arranged, consisting principally of various inventions in naval architecture, such as the construction of a bomb-ship, the arrangements of a transport for the conveyance of horses, &c. Round the room, an enclosed space contains a vast series of models of various descriptions; among these are the different instruments and contrivances for firing the Congreve-rocket; these are accompanied by specimens of this rocket of various sizes. A piece of wood fifteen inches square is shown, pierced by one



EFFECT OF A CONGREVE ROCKET.

of these terrible instruments of war, as a proof of the great force with which they are driven.

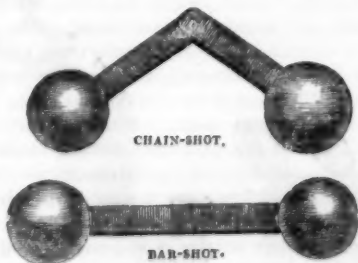
This rocket was first used at the bombardment of Copenhagen, and is so celebrated in modern warfare, that it deserves a more particular description.

The case of the Congreve-rocket is formed of iron instead of paper, and many advantages arise from this circumstance; the resistance of the air to its passage is less, on account of the combination of a greater weight, with a smaller diameter, so that the range of the missile is extended; the hard pointed end of the rocket also enables it to penetrate solid substances. The case of the rocket is formed of a cylinder of very soft iron, which is dovetailed together and soldered; if it is three inches in diameter, the thickness of iron requisite is but the fifteenth of an inch, and so in proportion. The inside of the case is lined with cartridge paper, pasted in. The pointed conical head is also of iron, but much thicker, and, according to the service it has to perform, is armed with hooks or otherwise.

The uses to which these rockets have been applied, are various; if they are intended to set fire to buildings, they carry with them a case containing highly combustible substances, which can be ignited after the lapse of any space of time, by means of a slow match; in other cases they are loaded with shells or grape shot, which, when they explode, commit dreadful havoc.

The distance to which a rocket will reach, of course depends on its weight and the charge with which it is loaded; it may be stated at from two to three thousand five hundred yards. In discharging the Congreve-rocket, metal tubes, fixed in a frame, are used: these tubes are of sufficient size to allow the rocket free motion. The inclination at which the tubes are placed directs the course of the missile; for these rockets are not fired perpendicularly, but in a slanting direction, according to the distance they are intended to reach.

Specimens of the different kinds of shot are found near these last: as *canister-shot*, consisting of a tin-case, filled with a number of bullets or small round shot. *Grape-shot*, nine or more small round shot tied up in a canvas bag and corded round; the number of the balls being generally odd, gives the mass something the appearance of a bunch of grapes.



Chain-shot consists of two round shots linked together by a jointed bar of iron. *Bar-shot*, connected by a solid bar of iron, instead of one jointed. The two last are used for the purpose of dividing the masts and spars of an enemy; besides others of various forms and sizes contrived for the destruction of life. There are models, also, of several large cannon, one taken at Agra that weighed sixteen tons, and another at Bejapoor weighing forty tons. The models of gun-carriages are very numerous, from the rudest to the most perfect. Those representing the Russian artillery are accompanied by models of the horses by which they are drawn, and of the mode of harnessing them.

A BALLAD.

SIR EUSTACE sat, at midnight's hour,
Within his tent alone,
And the spell of memory's silent power
Was o'er his spirit thrown:
It bore him from Salem's leaguerd wall
To her he had left in his castle-hall.
For Ermengarde, his only child,
The beautiful and young,
Had often at that hour beguiled
His spirit as she sung:
Bidding her father's heart rejoice
With the magic sound of her silver voice.
And on his harp he used to play
To her in that old hall;
He had brought his harp with him away,
But now 'twas silent all;
It hung in his tent by the cresset's light,
And his eyes as he viewed it with tears were bright.
That cresset's light grew pale and dim,
On his ear a sound there stole,
The echo of a dirge-like hymn
Poured for a parted soul:
And the strings of that harp, which in silence slept,
As if by a spirit's hand, were swept.
He shed no tear, he heaved no sigh,
And not a word he said;
He knew, from that mystic melody,
Her soul from earth was fled:
So he threw by his lance, and sword, and shield,
And at break of day left the tented field.
He reached once more his castle hall,
He entered the chapel fair;
A marble tablet hung on its wall,
And a withered rose was there:
He knelt him down, and in silence prayed,
And died a monk in the cloister's shade.—BARTON.

LIFTING OF THE KREMLIN BELL.

IN the month of July, 1836, a successful attempt was made to raise the enormous bell which had been so long buried in the earth, in the Kremlin, at Moscow. This bell*, one of the wonders of Moscow, was cast in 1733, at the command of the Empress Anne, by a Russian founder, Michael Motorine. It is, according to Clarke, 21 feet 4½ inches high; at two feet from the bottom its circumference measures 67 feet 4 inches; its diameter at that height is consequently about 21 feet 6 inches. Its thickness, at the part intended to be struck by the hammer, 23 inches. The Russians estimate the weight at 12,000 poods, which is nearly 200 English tons. The reputed elegance of its form, the style of its bas-reliefs, and the richness of its metal, composed of gold, silver, and copper, contributed to make it remarkable as a specimen of the advanced state of the art of casting in Russia, at the epoch of its execution.

M. Montferrand, a gentleman greatly distinguished in Petersburg by the numerous works he has executed, was intrusted with the direction of the operations. As the bell was lying in a cavity in the ground, and more than thirty feet below the surface, a large excavation was made to clear it. Over this was constructed a strong and lofty scaffold for the attachment of the blocks, and for the temporary suspension of the bell at a proper height. At half-past five in the morning, the authorities of Moscow, and a large number of spectators being assembled on the spot, prayers were offered up for the success of the attempt, and the operations commenced on a signal given by M. Montferrand. Six hundred soldiers instantaneously set-to at a large number of capstans. The enormous weight was mastered, and the bell was soon seen to rise slowly in the pit. Forty-two minutes elapsed during its elevation to the necessary height. No accident occurred. The first operation being finished, the next was to build a platform beneath the suspended bell. This was completed in eight hours, and the bell lowered upon it. On the following day it was placed on a sledge, and drawn by means of an inclined plane, up to the pedestal intended to support it, and there finally left, on the 26th of the same month.

This colossal work of art is, after all, but a mere curiosity. Its use as a bell is impossible, from a fracture, about seven feet high and two feet wide, in the lower part, where it is 23 inches thick. The cause of this gigantic injury rests entirely upon conjecture.—*Magazine of Popular Science.*

* See *Saturday Magazine*, Vol. III., p. 117.

WRITING MATERIALS.

No. VIII.

ON INKSTANDS.



PETRARCH'S INKSTAND.

THE above sketch will convey a tolerably correct idea of the beautiful Inkstand of Petrarch, whose genius and classical purity of mind diffused a lustre around him, which contributed greatly to promote the revival of learning, and the love of the arts and the elegancies of life, in the fourteenth century. We can fancy him composing some of his immortal poetry, or transcribing some of the manuscript works of minds congenial with his own, with the above Inkstand before him: thinking of the golden age of Augustus, of Horace, Virgil, and Ovid: thinking as they thought; imbibing a full draught from the same Pierian spring; enjoying similar honours, (for Rome crowned him with laurel and with myrtle,) and enduring similar pains.

I delight, (says Petrarch,) in my pictures; I take great pleasure also in images; they come in show more near unto nature than pictures, for they do but appear; but these are felt to be substantial, and their bodies are more durable. Amongst the Grecians, the art of painting was esteemed above all handicrafts, and the chief of all the liberal arts. How great the dignity hath been of statues, and how fervently the study and desire of men have reposed in such pleasures, emperors and kings, and other noble personages, nay, even persons of inferior degree, have shown, in their industrious keeping of them when obtained.

The fine arts and literature constituted the charm of his life. In reference to his books, many of which were transcribed by himself, the admirable art of printing not being then invented, he says,—“Great is my delight in beholding such a treasure. * * * I have great plenty of books: where such scarcity has been lamented, this is no small possession: I have an inestimable many of books.”

However much we should desire to linger on the character of Petrarch, we must forbear, and return to the subject of the present article. The possessor of the Inkstand of Petrarch, is Miss Edgeworth, a worthy owner of so great a treasure. It was presented to her many years ago, by one who justly

estimated her rare talents, which were also employed to commemorate the gift in the following beautiful lines, entitled,—

PETRARCH'S INKSTAND.

By beauty won from soft Italia's land,
Here Cupid, Petrarch's Cupid, takes his stand.
Arch suppliant, welcome to thy fav'rite isle,
Close thy spread wings, and rest thee here awhile;
Still the true heart with kindred strains inspire
Breathe all a poet's softness, all his fire;
But if the perjured knight approach this font,
Forbid the words to come as they were wont;
Forbid the ink to flow, the pen to write,
And send the false one baffled from thy sight.

The discovery of the sepulchred cities of Pompeii and Herculaneum, has tended to throw much light on the domestic manners and customs of the ancient inhabitants of Italy. In the museum at Naples are preserved large quantities of domestic implements, and among the rest, of writing materials. The information they convey has already assisted us in the present series, and the following figures will give the reader an accurate idea of the Inkstands of the Romans.

Fig. 2 represents a double Inkstand, formed of two cylinders joined together; the one intended for black and the other for red ink: each cylinder is furnished with a cover. Near this stand lies the *calamus* or reed, cut to a point, which served the purpose of a pen.

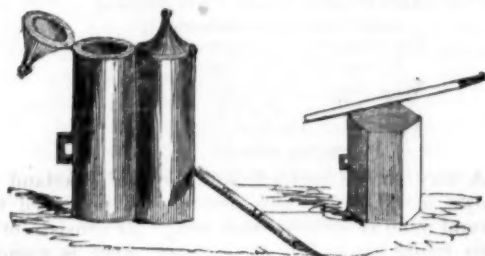


Fig. 2.

Fig. 3.

Fig. 3 is a single Inkstand of a hexagonal or six-sided form, with a ring at the side to pass the finger through in carrying. Upon this is a sort of pen, but from the absence of knots or joints, it is probably a *stylus*.

Fig. 4 is a double Inkstand, with the *calamus* or reed-pen.



Fig. 4.

Fig. 5.

The above instruments, and others of their kind, are made of silver, lead, horn, wood, and other materials. In the twelfth century, and for a considerable time afterwards, the usual form of Inkstands was an inverted truncated cone. Rich stand-dishes have frequently been found among the relics of past ages. For several centuries horn was a favourite article in the manufacture of Inkstands; hence the term *inkhorn*, so common among old writers.

We come now to notice the Inkstands of our own time.

When good ink is once provided, it may appear to most persons to be a matter of indifference what description of vessel is employed to contain it, so as to answer the daily occasions of the writer. An Inkstand is, however, an important article among writing materials, since its office is, or ought to be, not only to hold the ink, but to preserve it from dust, and in such a state of limpidity as to allow of an easy flow from the pen, and to produce written characters of a uniform degree of blackness.

If dust be allowed access to ink, thickness is produced, a quality which never belongs to good ink. Thickness is also produced by exposure to the air, from another source, which is evaporation. The latter process depends for amount upon temperature; the liquid portion of the ink passing off in the form of vapour, in quantities proportionate to the heat of the room and the extent of liquid surface exposed. Now, as evaporation affects only the aqueous portion of the ink, and the solid colouring particles are suspended in a liquid medium which is constantly decreasing, a thickening of the ink, as it is called, is a necessary result. By continued evaporation the whole of the water will pass off, and the colouring matter will alone remain in the Inkstand, as a hard dry mass. This circumstance is pleasantly, but not quite correctly, alluded to by Cowper, in his *Ode to Apollo, on an Inkglass dried in the Sun*.

Al! why, since oceans, rivers, streams,
That water all the nations,
Pay tribute to thy glorious beams
In constant exhalations—

Why, stooping at the noon of day,
Too covetous of drink,
Apollo, hast thou stol'n away,
A Poet's drop of ink?

A very simple and efficient form of Inkstand is shown in fig. 5, in which ink may be preserved for several months without thickening. It consists of a glass bottle open only at *s*, where there is a small mouth large enough to receive the pen. This bottle is filled by inclining the closed part, *a n*, downwards, and pouring in the ink at *s*: the ink will displace a portion of air in the bottle equal to its own bulk, and will not overflow at *s*, on account of the atmospheric pressure balancing the liquid column in the bottle. In this example, evaporation is small, because the surface at *s* is small, and a very minute portion of the ink being exposed to dust, no thickening occurs. Bird-cage fountains are constructed on similar principles.

A few improved Inkstands have, of late years, been made the subject of patents. One of these, by Mr. Edwards, is a useful and elegant invention. It consists of an external cylinder of bronze, containing a cylinder of glass, in which an accurately fitting glass piston moves by a very ready adjustment: below this piston is the ink, imbibed by a quantity of loose hair or wool. From the lower part of the stand proceeds a tube and a conical cup, which is filled with ink by slightly depressing the piston, and thus the pen is supplied. When not in use, this cup can be emptied in an instant, by giving a slight upward motion to the piston, and the wool being relieved from pressure, re-absorbs the ink. Should any of the ink flow over the conical cup, it is received into a saucer below, and can be returned into the reservoir.

Mr. Doughty, the inventor of pens with ruby nibs, has contrived an Inkstand which is lined with India-rubber, to prevent the nibs of his pens being injured by striking against the glass of common Inkstands. For a description of his peculiar pens we must refer to our article on steel-pens,

One of the best forms of portable Inkstands is the subject of Messrs. Horsley and Cooper's patent, which affords a convenient and air-tight stand, and not liable to corrosion, as most portable Inkstands are. This object is effected by bringing into contact two circular disks of glass, the flat surfaces of which are perfectly plane. These are fixed at the centre to a bar of metal, placed across the mouth of the stand. Each plate has a hole large enough to admit the pen, and the stand is opened by sliding the upper plate upon the under one, so as to make the two holes coincide; and this coincidence is ensured by means of two studs fixed to the upper plate. The aperture is closed by sliding the unperforated part of the upper plate over the hole of the lower plate, and in this state the stand may be carried about in the pocket, or packed with linen and books, without any fear of leakage. The simplicity of this invention, and the ease with which it is opened and closed, justly entitle it to the highest praise that can be bestowed upon a portable Inkstand.

ON THE LIGHT OF THE MARINE ANIMALS.

LIGHT diminishes rapidly in passing through water. At a certain depth, the sun itself would be invisible, as if a plate of iron had been interposed. Experiments have been made to ascertain what thickness of water excludes all light; but as yet without success. But while these estimates refer to the full light of the sun, and as the light of a cloudy day, of twilight, and of night, are successively far inferior, there must be many and long periods in which darkness reigns at very small depths, since the quantity transmitted is proportioned to the intensity.

It is also familiar, that many fishes reside in the deeper parts of the sea, as is true of the Ling among others, and on the bottom, as occurs in the flat fishes; while, moreover, many are nocturnal, sleeping in the day, and seeking their food in the night. On the land, absolute darkness is a very rare occurrence, while the nocturnal animals have a peculiar provision for discovering their prey, in a large pupil and highly sensible nerve. But under the entire want of light, that must often exist in the sea, no such power could be a compensation; while in minor cases, the great velocity of these tribes, and the frequent consequent distances between the pursuer and the pursued, must also be an obstacle to distinct vision. Under any view, it must have been impossible to prey at night; since our own least visible light must be pure darkness, even near the surface.

Here then is a world without light, the habitation of myriads of the most active and rapacious animals of creation: often social, performing various functions, moving over great distances with the rapidity of birds, and, above all, provided with organs of vision. Did naturalists never reflect on such a world, or ask themselves how such pursuits were carried on in utter darkness? They had not thought on the darkness alone of that world: and when they knew it, and did not inquire how the inconvenience to its inhabitants was remedied, is it not because they too often forget to view creation as they ought, to inquire of intentions and final causes, to look higher, and think more deeply of Him who has neglected nothing essential to the good of his creatures? He who sees God, wise, beneficent, and governing, will find a clue to his studies, and the solution of his difficulties.

A remedy for the interception of the sun and the absence of light, was wanted: day could not be brought into the depths of the ocean, for the laws of

light forbade it: yet, to at least the mutual pursuit of its inhabitants, that was indispensable. It remained for Him who created the difficulty, to invent the remedy. I do not say that man might not have suggested it, though he seldom recollects that he knows nothing but what creation and its Creator have taught him,—often also apparently teaching him as specially as the insect, on whose instinct he looks down with contempt, while priding himself on his superiority of reason. But even if he could have imagined the remedy, it was boundless power alone that could have furnished it. And the Creator has done this by means, the nature of which we cannot comprehend; yet not more ignorant here than in all other cases of that local production of light, independently of the sun and of combustion, to which the vague term phosphorescence is applied.

The never-failing wisdom and power of the Creator have established an independent source of light beneath the ocean; and it has been disposed in the precise manner required to answer the intended purposes. The animal itself was to be seen amid utter darkness; and it is rendered luminous, or becomes, itself, a source of light. Nor can we doubt the design and the purpose here, when we find the provision universal and the purpose necessary, and when we also can conjecture of no other mode in which it could have been attained. The great pursuit of all animals is food, and the food has here been rendered luminous, that it might be discovered. But for this provision, the deep-residing fishes could not have found the means of existing at the bottom of the sea, and the night-preying ones would have been for ever helpless: while my own investigations have shown, that there are predatory kinds immovably fixed to the bottom, at depths of 6000 feet, where darkness is eternal.

The truth of this view is confirmed by the effect of luminous bodies on fishes. Even in ordinary day-fishing, it is a brilliant object, not a definite form, or a fish, which is the subject of pursuit, and it is so especially, as might be expected, among the swift fishes. It is the bright silvery skin of the bait which is the attraction, and familiarly so in the mackerel, equally ready to seize a shining piece of metal or a brilliant feather. Thence, also, the use and effect of nocturnal lights in fishing: well known to our remote predecessors among the ancients, to the inhabitants of the Mediterranean, and even to savage nations; all profiting by that knowledge which we disdain or neglect. If adopted in the fraudulent salmon fishery, and there only, no one seems aware that the light, supposed to aid ourselves in seeing the fish, is in reality its bait. It is the object of pursuit, because it is the expected prey.

But this is not all of the Divine contrivance on this subject: while, if the object is the same,—the discovery of prey by the means of light, the mode of attaining that end is different, as there is some difference also in the nature of the prey itself. How far the chemical sources of the light might coincide or differ, we do not know: but the one at least belongs to vital action, while the other is engaged with dead matter.

In all the living marine animals, the light is brilliant, often of different colours, commonly confined to a certain portion, or organ; or, at farthest, to the surface, under the command of the will, and dependent on life, since it disappears at the death or capture of the subject, as the interior parts also show no signs of it. But shortly after death, the whole body becomes luminous, displaying a pale uniform light; and the luminous matter can be detached and diffused through water, while the living light cannot,

This fact is familiar in our larders; and though commonly attributed to putrefaction, it commences long before this process, and even ceases as that is established. And if the purpose of this second contrivance is plain, so ought it always to have been. The dead animal, in this condition, is still food: by putrefaction it would be wasted, and might be injurious, as such matters are, in the atmosphere: it becomes an object of attraction under this new expedient, as it had ceased to be, in losing its former powers of producing light with the loss of its life. And the wisdom is not less shown in conferring this new property anterior to putrefaction: since it is then more valuable as food. Here, again, we see the utility of final causes in the discovery of truth: since naturalists had always considered this as a mere result of putrefaction, and thus given a false view of a fact in nature, from neglecting its Author.

Of the living lights we are even more ignorant than of the dead; since we cannot detach the luminous substance, if there be one, nor discover the organs by which it is produced. In the larger fishes, it seems to exist over the entire surface, as it is evidently the temporary produce of an act of volition; though it is not easy to judge correctly of the facts, as it is possible that the light around them may, partly at least, be produced by the disturbance of minute animals in contact with them. This, however, will not of itself explain the appearances: since, in that case, it should attend every movement, whereas it is but occasional, and is excited, among other things, by a noise or an alarm. And that the luminous property does not belong to the water itself, we are assured, by finding that it never exists unless animals are present; while if the crowds of the nearly microscopic ones are the cause of that general light which seems to have given rise to this error, so does it require an equally minute investigation to detect those hitherto almost unsuspected myriads. Seamen, knowing the difference between blue and green water, know also that the former very rarely contains such animals, and is as rarely luminous. With some noted exceptions in the ocean, it is on the shores chiefly, that we find highly luminous water prevailing.

I believe the power of producing light to be an universal property in the marine tribes; and that belief is confirmed by the fact, that I have never found a species, however microscopic, in which it did not exist. I except the shell-fishes, however; and if there are obvious reasons why the display should there be difficult, so must I plead ignorance of what is of no easy investigation. Yet the *Pholades* are known to be luminous, and the places of others are generally marked out by luminous parasites. But in all others of the marine animals which are not fishes, from the largest *Medusa* or *Holothuria*, down to the most minute *Beroë*, *Cyclops*, *Vorticella*, or *Vibrio*, there seems a particular point, or organ, adapted for this purpose, which, however, we cannot discover, as the light which is our only guide for it, disappears in that which is necessary for its examination; as also we cannot find any organs in many of these, beyond the stomach and ovaria, and the tentacula or other appendages. And the reason for this conclusion is, that in *Medusæ* of a foot in diameter, the light will sometimes not exceed a pea in size, though in others, as in the *Cyclops* very often, its brilliancy causes it to appear larger than the whole body. The colour of the light varies; it is sometimes snow white, or else of the electric blue, or of a greenish tinge, or reddish, or yellow, or even scarlet.

Such then is the true source of those often brilliant, sometimes terrific appearances, so frequently observed

at sea. Above a shoal of fish, an alarm will often excite a sheet of fire resembling submarine lightning. In the tropical regions, the surface of the sea sometimes resembles a plain of snow, from the same cause. The flashes occasionally seen under the water, are produced by the larger fishes; and the line of light which attends the descent of a rope, is caused by the disturbance of the minuter animals. The twinkling stars so common on our own coasts, are generally the produce of *Medusæ*; and whenever a light is lifted on an oar, it is easy to secure and examine the animal, so as to satisfy ourselves of the cause; while if that is as easily done on sea weeds, or shells, it is the more surprising that any mystery should ever have existed on this subject. The fearfully luminous appearance of the sea in storms, equally arises from the crowds of these animals thus brought to the surface, and kept in a constant state of agitation. Nor let the universality of this light, in any case, excite surprise. Had the water been examined, as it had not, we need not have supposed itself to be luminous, when it will be often found so teeming with life, as to be turbid, as if from diffused sand.

Inasmuch as the lights are an enticement to the pursuer, the whole effect, to the pursued, would be evil, were it not for that compensation which seems never wanting. The light is under the command of the animal; and the defence is, to obscure it. This is easily ascertained in those which we can separate and detain. If much irritated, or alarmed by the disturbances of the water, they extinguish the light, though it had long been shining steadily; while, when again producing it, a far slighter alarm suffices to obscure it, as if they were on the watch; as, after a repetition of those, it is permanently extinguished. This is obviously an instinct of defence, arising from the knowledge that obscurity is safety. If any of those animals are excited, by a needful curiosity, to display their lights, or if those are used as a guide for their own pursuits, as seems to be the case with the larger fishes under alarm, I know not that there is sufficient experience to determine this point. But it must not be objected to the preceding views, that the lights in question cannot serve the asserted purposes to the inferior marine animals, inasmuch as many are without eyes. Eyes are now known to exist in very many which were long supposed to be, in many other respects, also, of a more defective organization; and even where they are assuredly wanting, as in the *Medusæ* and *Beroes*, there is a perfect sense of the presence of a luminous object, since they pursue a moving candle as correctly as a fish could have done, and will crowd round the single opening for the admission of light which has been left in a darkened vessel.

[Abridged from MACCULLOCH'S *Proofs and Illustrations of the Attributes of God.*]

To live in the present day, unconscious of the effects of divine wisdom, so palpably displayed in every object that is presented to man's senses, betrays little less than an inexcusable, self-satisfied, ignorance.—MAUND.

Nothing surely can be better adapted to turn man's thoughts off his own self-sufficiency than the works of nature. Wherever he rests his attention, whether on matter organized or unorganized, there he will discover convincing evidence of his own ignorance; and at the same time, the omnipotence of a first great Cause will be impressed on his mind, and influence his understanding.—MAUND.

GAMING.—It is possible that a wise and good man may be prevailed on to game; but it is impossible that a professed gamester should be a wise and good man.—LAVATER.

CIVILIZED LIFE.

A GENERAL diffusion of knowledge, owing greatly to the increased commercial intercourse of nations, and therefore to the improvements in the physical departments of astronomy, navigation, &c., is changing everywhere the condition of man, and elevating the human character in all ranks of society. In remote times, the inhabitants of the earth were generally divided into small states or societies, which had few relations of amity among themselves, and whose thoughts and interests were confined very much within their own little territories and rude habits. In succeeding ages, men found themselves belonging to larger communities, as when the English heptarchy was united; but still distant kingdoms and quarters of the world were of no interest to them, and were often totally unknown. Now, however, every one feels that he is a member of one vast civilized society, which covers the face of the earth; and no part of the earth is indifferent to him. In England, for instance, a man of small fortune may cast his looks around him, and say with truth and exultation, "I am lodged in a house that affords me conveniences and comforts which, some centuries ago, even a king could not command. Ships are crossing the seas in every direction, to bring me what is useful to me from all parts of the earth. In China, men are gathering the tea-leaf for me; in America, they are planting cotton for me; in the West India islands, they are preparing my sugar and my coffee; in Italy, they are feeding silk-worms for me; in Saxony, they are shearing the sheep to make me clothing; at home, powerful steam-engines are spinning and weaving for me, and making cutlery for me, and pumping the mines, that minerals useful to me may be procured. Although my patrimony was small, I have post-coaches running day and night, on all the roads, to carry my correspondence; I have roads, and canals, and bridges, to bear the coal for my winter fire; nay, I have protecting fleets and armies around my happy country, to secure my enjoyments and repose. Then, I have editors and printers, who daily send me an account of what is going on throughout the world, and among all these people who serve me. And in a corner of my house, I have books! the miracle of all my possessions, more wonderful than the wishing cap of the Arabian tales; for they transport me instantly, not only to all places, but to all times. By my books, I can conjure up before me to vivid existence, all the great and good men of antiquity; and for my individual satisfaction, I can make them act over again the most renowned of their exploits; the orators declaim for me; the historians recite; the poets sing; and from the equator to the pole, or from the beginning of time until now, by my books I can be where I please." This picture is not overcharged, and might be much extended; such being God's goodness and providence, that each individual of the civilized millions that cover the earth, may have nearly the same enjoyments as if he were the single lord of all.—ARNOTT'S *Physics*.

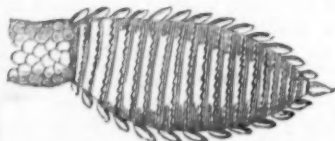
It is our grand fault, that we are affected presently according as everything appears in the face, and we stay not till it turn about and show us the other side. So the pleasures of sin deceive us, which come on with a beauteous countenance and smiling looks, with a painted face and flattering words, but go off again with blushing and shame, with pain and sorrow, and all the ugliness appears, when they have but turned their backs upon us. And so the cross accidents of the world do dismay us in such like manner, which come upon us with a sad and cloudy look, but have a bright side behind; and if we would but be patient till the shower or storm be over, we might behold the face of the sun breaking forth upon us.—BISHOP PATRICK.

FACTS IN COMPARATIVE ANATOMY.

No. VI.

FOOT OF THE GECKO.

WE well know the house-fly is capable of walking on the ceiling of a room, thereby supporting itself against the power of gravity; but there is an animal of a much larger size, which possesses the same power; namely, the Gecko, a small species of lizard, a native of the island of Java, which comes out of an evening from the roofs of the houses, and walks down the smooth, hard polished walls, in search of the flies which settle upon them, which are its natural food, and then runs up again to the roof of the house.



UNDER SIDE OF THE GECKO'S FOOT.

The foot of this lizard has five toes, at the end of each of which, except the thumb, is a sharp claw much curved. On the under surface of each toe there are sixteen transverse slits, leading to so many cavities, or pockets, the depth of which is nearly equal to the length of the slit that forms each orifice; they all open forwards, and the outer edge is notched like the teeth of a saw; on each side of the bones of the toe a large oval muscle is placed, connected with smaller muscular strings, which are attached to the pockets and their serrated edges; when these smaller muscles are brought into action, they pull back the notched edges, and the opening of the pocket is pressed against the wall; the muscles continue their action and open the mouths of the pockets, by that means enlarging the cavity and producing an imperfect vacuum. A provision similar to this enables that singular fish, the Echeucis, to adhere to the bodies of larger fish; and we have another familiar instance in the foot of the house-fly.

GREAT advantages are now afforded for self-instruction by the number of elementary books, executed with much ability for this very purpose. But there is one important caution which must always be borne in mind by the young or unsuspicious, without guide or friend to direct their choice of books, or give a hint where with *much* that is valuable, there may also be *some* that is far otherwise. It is a melancholy fact that great abilities and literary acquirements have not always been united with religion. Many, alas! have possessed them, and at the same time held infidel opinions. Of this number were Voltaire, Frederic the Second ("Great") of Prussia, many of the writers of the French Encyclopedia, &c. The "great" Earl of Chesterfield, whose letters to his son were at one time fashionable, inculcates polished manners, but pays no attention to religion; on the contrary, rather discourages it. Frequently, in works of a literary character, such men are mentioned with admiration, for their writings, their talents, or their learning; and any mention of their bad religious principles is omitted, either by accident or design. A young or unlearned reader may meet with the works of persons with whom he is *thus* only acquainted, and may unwittingly imbibe the poison they contain. When he has no means of ascertaining the *character* of his author, either from other books, or a religious and judicious friend, let him collect his *own* religious belief about him, and whenever he meets with what he cannot reconcile to it, let him consider himself on the brink of a precipice, and remember, that learning, though valuable, may be bought too dear. Without it, he may, by the grace of God, attain everlasting happiness; without religion, he cannot.—?

NOTHING IN NATURE LOST.

As we look around upon the world, we see that change is written upon all things earthly.

..... Day follows night, and night
The dying day; stars rise and set, and rise;
Earth takes the example; 'tis revolution all.

Flowers bloom but to fade; the leaves of Summer fall before the chilling blasts of Autumn. But chemistry teaches that what seems annihilation in all this, is but a change of form, and that, in the following seasons, the same elements, once possessed of life, will be combined anew, and bud and blossom in a renovated and more perfect shape. The race that expires, having marked the circle appointed by the Creator, prepares the bed in which a new generation springs up to regale the air and the earth with their beauty and their fragrance, and then give place in turn to other generations. Chemistry teaches that the dew-drop that glitters in the sun, and the passing cloud, and the morning mist, very emblems of evanescence and decay, though they vanish after a little season, yet are not lost, but re-appear in another type, to endure as long as moon and stars. Every drop of water that existed when the ocean was gathered into its place, is in existence now, either locked up in solid crystal, or floating in the cloud or mist, or concentered in the bodies of animals or vegetables, or congealed into ice or snow, or flowing in rivers, or piled up in the depths of the sea. Matter cannot be destroyed unless by that Power which gave it being; finite power can but change its form. The fire, which in cheering the social hearth, seems burning to destroy, is only transforming matter into new shapes.

Thus the pit coal, the remains, it may be, of the plants of an antediluvian world, and which for thousands of years has retained the elements of life locked up within it, gives them out once more under the influence of combustion. Its carbon, uniting with the oxygen of the atmosphere, assumes an aerial form, and its hydrogen, combining with the same principle, ascends in the form of invisible exhalation. This stream of vapour is gradually condensed into clouds, and falls to the earth in fructifying showers; and the carbonic acid gas, by other chemical agencies, is also brought down again, to hasten the growth of vegetables, enter into their systems, expand in their leaves, paint the gorgeous tints, and go abroad in the aroma of their flowers? What more beautiful than such a series of changes? The plants which adorned the earth in its early freshness, having slumbered for ages in lifeless masses of coal, again made active, and after warming in the fire, and cheering in the brilliant gas-light, and, as the generator^{of} steam, setting a thousand wheels in motion for the maintenance of our race, recalled once more to the living world, to an appointed place among kindred plants, until it shall be the will of Him who created them to call them to their last repose.

THE authors of a fraud must preserve harmony, or they are ruined. But truth is always safe. Honest men are afraid of no disclosures.—P. S. DODD.

THE instability of friendship furnishes one of the most melancholy reflections suggested by the contemplation of human life; and few of us have travelled far upon our pilgrimage, without having had occasion to lament the loss of some companion who has parted from our side upon the first rumour that we have wandered from the fountains of the desert.—WILLMOTT.

LONDON:

JOHN WILLIAM PARKER, WEST STRAND.

PUBLISHED IN WEEKLY NUMBERS PRICE ONE PENNY, AND IN MONTHLY PARTS, PRICE SIXPENCE.

Sold by all Booksellers and News-vendors in the kingdom.